Conservative Treatment of the Anterior Worn Dentition with Adhesive Composite Resin

As our patients are getting older and keeping their teeth longer, the wear of the incisal edges of anterior teeth has become more pervasive. Some have viewed tooth attrition as reaching epidemic proportions. In most cases attrition of the mandibular incisors is seen as loss of the enamel incisal edge leaving the dentin exposed. This is readily visible by the patient especially when the dentin picks up stain. In the case of the maxillary incisors the wear may not be readily apparent to the patient because it is on the lingual surfaces of the teeth but may be evident due to chipping of the incisal edges and an increase in incisal translucency where the underlying enamel has worn thin.

Tooth attrition has been classified by Pinborg as either physiologic (the gradual and regular loss of tooth structure as a result of natural mastication), pathologic (wear confined to a single tooth or groups of teeth caused by abnormal function or position of teeth), or intensified attrition (wear that is more extensive than would normally be expected).

In most clinical cases, tooth wear is not a single cause-and-effect condition. The wear may be caused by a combination of factors including attrition, abrasion, and erosion. The conditions of tooth wear can be classified based upon fundamental wear mechanisms.

These mechanisms are:
- Surface-to-surface wear
- Slurry wear (early stage)
- Corrosive wear (erosion)
- Surface-to-surface wear for teeth can be either enamel-to-enamel in contact movements with subsequent microfractures of the enamel structure, or the harder substance, enamel, plowing up the opposing softer dentin substrate. This mechanism of enamel wear is usually due to tooth grinding or bruxism. Slurry wear can be characterized as an abrasive slurry between two moving tooth surfaces that is also referred to as "three-body wear" because there are three surfaces in function—the tooth structure on either side and the food substrate. Corrosive wear, also referred to as erosion, is a non-microbial acid-induced tooth loss. Clinically, the diagnosis of these conditions can be made by the appearance of the tooth surfaces in different occlusal positions. Surface-to-surface wear can be seen where the teeth interdigitate. Where slurry wear has occurred, the teeth do not fit together in all aspects of the tooth loss. This concept has been frequently referred to as erosion.
- The cupping of dentin on incisal edges and the flattening of posterior cusp tips with the exposing dentin, the Class VI lesion, can be attributed to this type of wear. Corrosive wear from acids can be caused by ingesting acidic foods and beverages or by stomach acid attacking the teeth as a result of bulimia or stomach acid reflux. In actuality, the diagnosis of tooth wear is multifactorial in most cases.

How does one treat the anterior worn dentition when dentin is exposed and is continuing to wear and the amount of enamel loss just barely exposes dentin? In some cases the patient notices and asks about the discoloration of the incisal edges of their mandibular teeth due to exposed dentin; other times, the patient notices a bluish translucency at the incisal edges on the facial surfaces of the maxillary incisors caused by the worn dentin on the lingual surfaces of these teeth leaving only enamel that is translucent. In some cases the incisal edges can be restored to the existing vertical dimension with direct composite resin.

This article will describe a conservative treatment of the worn anterior dentition using direct bonded, wear resistant composite resin.

CASE REPORT: MANDIBULAR INCISAL WEAR

A 53 year-old man presented to the dental school clinic requesting treatment for all his dental needs. As part of the treatment review, the patient asked if anything could be done for his lower front teeth that were chipping and discolored on the incisal edges due to exposed dentin (Figure 1). It was noted during the examination that the maxillary incisors and canines had some wear but did not require any intervention at that time since the enamel was still intact. After restorative treatment the plan was to provide the patient with a hard acrylic occlusal nightguard to control the patient's parafunctional habit of bruxing. The diagnosis of anterior tooth wear through the enamel into the dentin with a cupped out appearance indicative of a combined surface-to-surface and slurry tooth wear pattern was made. The restorative treatment plan for these teeth was the placement of direct bonded composite resin to restore the worn incisal edges and cusp tips of teeth #22-27. In the past, the use of composite resin to restore worn anterior teeth was not successful because the practitioner did minor tooth preparation (a bevel) on the facial and lingual surfaces to retain the restoration and an adhesive composite resin was placed in a thickness of only tenths of a millimeter. Within a short period of time, the restoration would be dislodged in function. Success with these restorations depends on a fundamental approach to tooth preparation to guarantee durability of the restoration.

In most cases the teeth to be restored do not need to be anesthetized. The exposed dentin is sclerotic and has little if any sensation. Use of the dental dam for tooth isolation allows the teeth to be prepared and restored with greater efficiency and with a controlled field for the adhesive procedure. Because of the tooth wear, the proximal contacts are usually broader and there is little if any incisal embrasure. It may be necessary to recreate the incisal embrasures using a narrow diameter needle-shaped finishing bur (ET3 fine, Brasseler USA, Savannah, GA). If this is not done at the start, it will be difficult to place the rubber dam.

TOOTH PREPARATION

Before preparing into the dentin, the enamel surface was finished and polished using an abrasive disk system (Softflex, 3M-ESPE, Minneapolis, MN) from medium grit to fine. A final polish of the enamel was accomplished using an intraoral rubber abrasive enamel-ceramic polishing point (Dialite,
Brasseler USA, Savannah, GA). The finishing and polishing of the enamel surface removes any irregularities of the enamel and loose enamel rods that can fracture after the completion of the restoration.

Using a small pear-shaped 330 bur, a preparation was made into the dentin to a depth of 1.0 mm (Figure 2). For smaller lesions, a 329 bur can be used because it has a length of 1.0 mm which is the preparation depth desired. A periodontal probe can also be used to verify the pulpal depth of 1.0 mm of the tooth preparation of all enamel walls (Figure 3). Past clinical experiences and clinical evaluations over the last ten years has shown that this depth into the dentin allows for adequate composite resin thickness to provide longevity to the restoration in function. The preparation removes only dentin leaving a shell of enamel.

RESTORATION PLACEMENT

After tooth preparation, the teeth were etched for fifteen seconds with a 32% phosphoric acid etchant (Uni-Etch, Bisco, Schaumburg, IL) (Figure 4) and then rinsed with an air-water spray for ten seconds. The tooth was light-cured, leaving a moist dentin surface. A single component, fifth generation adhesive (SeptoBond, Septodont, Lancaster, PA) was applied to the tooth preparation with a disposable brush (Bendabrush, Centrix, Shelton, CT) (Figure 5). In this author’s experience, self-etch adhesives can be used successfully for these types of preparations. The adhesive was gently air dried, keeping the air syringe four to six inches from the surface of the tooth so that the adhesive was not thinned before light curing. The adhesive was light-cured for twenty seconds. A dimer acid chemistry low-shrink, wear-resistant nanohybrid composite resin (N’Durance, Septodont, Lancaster, PA) was placed into the incisal preparations. The composite resin was shaped to the tooth surfaces using a plastic filling instrument so that there was little excess that needs to be finished (Figure 6). The composite resin was then light-cured for twenty seconds for each tooth.

FINISHING AND POLISHING

The composite resin placement as described leaves very little excess. In most cases, use of an abrasive-backed disk is not necessary. The finishing can be accomplished using a coarse grit thin disk (XT pop-on disk, 3M, St. Paul, MN) or aluminum oxide impregnated silicone disk (Enhance, Dentsply Caulk, Milford, DE) (Figure 7). The final polish was done using a super-fine Soflex disk (3M, St. Paul, MN). The rubber dam was removed and all occlusal movements were checked using a very thin, two-sided occlusal film (AccuFilm II, Parkell, Farmingdale, NY). It should be noted that the composite resin restores function in areas that the wear had removed needed function. In this case note the facial surfaces of the mandibular right and left canines have been restored to function in lateral excursions to protect the dentition with canine disclusion. A hard, acrylic, maxillary occlusal nightguard was fabricated to protect the dentition from parafunctional wear. The restored incisal edges have not only made the teeth more wear resistant but also have created a more esthetic result (Figure 8). For this patient, the maxillary anterior teeth were restored using the same technique (Figure 9).

CONCLUSION

In the past, practitioners would watch and reevaluate worn incisal edges of anterior teeth as they continued to wear. Intervention would occur when the crown height was significantly reduced and the only choice to restore these teeth was full coverage porcelain-metal crowns. With the conservative technique described, a wear-resistant composite resin to maintain the occlusion on these anterior tooth surfaces can be placed to defer the need for more extensive crown and bridge procedures in the future.

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REFERENCES


LEGEND FOR FIGURES:

Figure 1: Preoperative view of worn mandibular anterior teeth.
Figure 2: The teeth were prepared to a pulpal depth of 1.0 mm as evidenced by the cutting length of the #339 bur.
Figure 3: Verifying the depth of the preparation at 1.0 mm with a periodontal probe.
Figure 4: The preparations were etched with a 32% phosphoric acid gel for 15 seconds.
Figure 5: A 5th generation adhesive was applied to the etched tooth preparations.
Figure 6: Care was taken to shape the low shrink nanohybrid composite resin with a plastic filling instrument to minimize excess.
Figure 7: Initial finishing was done with an Enhance polishing disk.
Figure 8: The completed restorations are both functional and aesthetic.
Figure 9: A. Preoperative view of maxillary wear. B. Teeth restored with N’Durance nanohybrid composite resin.